

Endemic plants on granitic terrains of the North Pirin mountain - ecological and phytogeographical remarks

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Investigation of plant endemism is of primary importance for revealing the patterns of the flora formation and development, for specifying the trends of contemporary speciation and for predicting the changes in the vegetation. The spatial-ecological characteristics of the endemic plants are one of the most significant criteria for dividing the phytogeographical regions.

The North Pirin mountain is classic example for plant speciation place on calcareous terrains (KOZUHAROV, 1977; VELCHEV et al., 1992). Analysis and classification of the endemism of the calcareous flora of North Pirin mountain (reserve „Bajuvi Douпки - Djinjirica“) are made by NIKOLOV (1979; 1989). The present research is motivated by lack of concrete knowledge on the endemism patterns on the silicate terrains which area is about 65% of the territory of the mountain. The aim of the study is to characterize the ecobiological and phytogeographical structure of the Balkan class goeolements presented on granitic part of the North Pirin mountain.

Material and methods

The endemism of high mountain flora on silicate terrains in North Pirin was analyzed by using the concept of „concrete“ flora - the flora of a given water-catchment area (TOLMACHEV, 1931). The valley of Demianica river was considered as a representative for high mountain (coniferous, subalpine and alpine vegetation belts) flora on silicates terrains in North Pirin (Fig. 1.). Areal-diagnosis are given according MEUSEL (1965) and FISCHER & FISCHER (1981). Life-forms are given after RAUNKIAER (1934).

The study is carried out in the period 1992 - 1996. The highland morphometric zone dominates the region (area of 33 sq. km and altitude from 1300 to 2810 m).

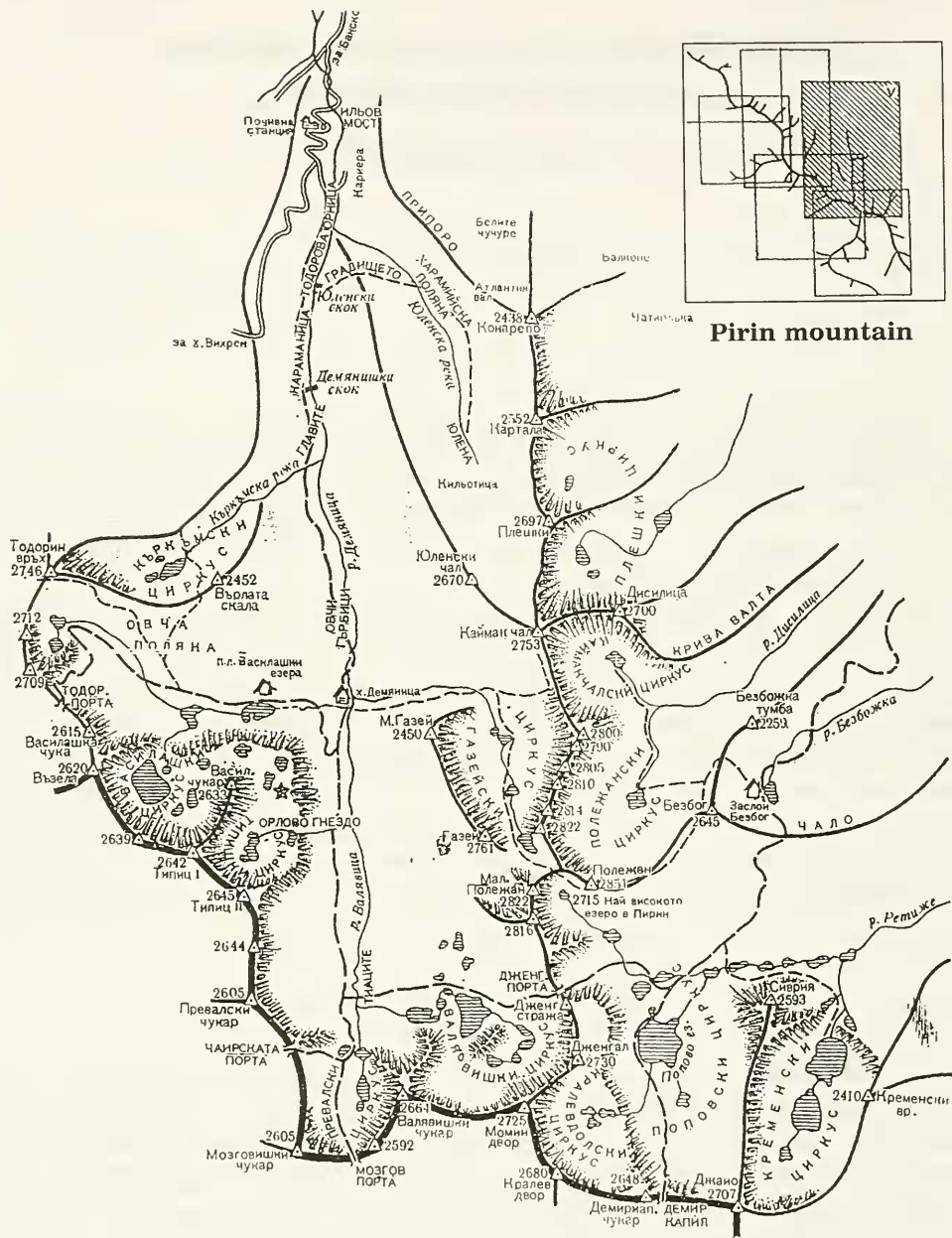


Fig. 1. Map of the studied area.

The cirque bottoms and the surrounding ridges are orientated mainly in the north-south and northwest-southeast directions. The recent geomorphological structure of the region is characterized by glacial and periglacial forms, referred to the Pleistocene glaciation. The rock substratum of Demianica valley consists of granites, granitogneisses, and crystalline schists (MARINOVA & ZAGORCHEV, 1993).

The following vegetation belts (after VELCHEV, BONDEV, GANCHEV, 1982) cover the area:

Coniferous forest belt: Developed from 1300 - 1500 up to 2000 - 2200 m alt. Formed by *Pinus sylvestris* L., *Picea abies* (L.) Karst, *Pinus peuce* Grsb. and *Abies alba* Mill.

Subalpine belt: from 2000 up to 2500 m alt. Formed by communities of *Pinus mugo* Turra., *Juniperus communis* L. subsp. *alpina* (Suter) Čelak., *Vaccinium myrtillus* L. etc. and herbaceous communities of *Festuca valida* (Uechtr.) Penzes, *F. paniculata* (L.) Schins et Thel., *Nardus stricta* L., *Poa media* Schur, *P. alpina* L., *Bellardiochloa violaceae* (Bel.) Chiov., etc.

Alpine belt: above 2400 - 2500 m. Formed by communities of *Sesleria comosa* Vel., *Agrostis rupestris* All., *Festuca pirinica* Horv. ex Markgr.-Dannb., *Carex curvula* All., *C. kitaibeliana* Deg. ex Bech., *Juncus trifidus* L., *Vaccinium uliginosum* L., etc., with presence also of: *Arabis alpina* L., *Campanula alpina* Jacq., *Empetrum nigrum* L., *Saxifraga pedemontana* All., *S. sancta* Grsb. subsp. *pseudosanta* (Janka) Kuzm., *Armeria alpina* Will., *Dianthus microlepis* Boiss., *Genista depressa* Bieb., etc.

Results and discussion

The vascular flora in the region under study consists of 709 species (subspecies). The Balkan floristic element is presented by 78 taxa (59 species and 19 subspecies) which belong to 54 genera and 21 families (Table 1.). These taxa form 11% of the total number of species (subspecies) found in the region.

The families with highest number of endemic taxa are Poaceae - 9, Caryophyllaceae - 8, Apiaceae, Rosaceae and Asteraceae - 7, etc. The richest in endemic taxa genera are *Alchemilla* - 6, *Festuca* - 5, *Campanula* - 4, *Silene* - 3. The average number of species in each family is 3.7 and in each genus - 1.4. Two species and one subspecies have a distribution restricted to the territory of Pirin mountain (Table 1.) The areals of six species and three subspecies are in the Moesic floristic province. The highest number of endemic taxa (56%) include in their areal-diagnosis the Macedonian floristic province, followed by the Illyrian - 41% and Albanian province - 32% (Fig. 2).

Table 1

List of endemic taxa

I	II	III	IV	V	VI	VII
APIACEAE						
1	<i>Angelica pancicii</i> Vand.	H	mhg	illyr-mes-mac	0,7-2,0	1 2
2	<i>Carum graecum</i> Boiss.et Heldr.	H	x	alb-illyr-mes-mac-trac	0,9-2,1	1 2
3	<i>Heracleum angustisectum</i> (Stoj. et Acht.) Peev	H	m	mes(Pirin)	1,0-2,0	1
4	<i>Heracleum verticillatum</i> Panč.	H	mhg	alb-illyr-mes-mac-trac	1,0-2,5	1 2
5	<i>Pastinaca hirsuta</i> Panč.	H	mx	mes-mac-trac	0,5-2,0	1 2
6	<i>Peucedanum oligophyllum</i> (Grsb.) Vand. ssp. <i>aequiradium</i> (Vel.) Acht.	H	mx	illyr-mes-mac	1,1-2,6	1 2
ASTERACEAE						
7	<i>Carduus thmoleus</i> Boiss. ssp. <i>armatus</i> (Boiss.et Heldr.) Franco	H	m	mes-mac-trac	1,5-2,0	1
8	<i>Centaurea kernerana</i> Janka	H	xm	mes	1,8-2,7	2 3
9	<i>Centaurea rhenana</i> Boreau ssp. <i>tartarea</i> (Vel.) Dost.	H	mx	mes	0,1-2,7	1 2 3
10	<i>Cirsium appendiculatum</i> Grsb.	H	m	alb-illyr-mes-mac	1,0-2,5	1 2
11	<i>Erigeron alpinus</i> L. ssp. <i>rhodopaeus</i> (Vierh.) Koz. et Andr.	H	mx	illyr-mes	1,8-2,5	3
12	<i>Hieracium pseudopilosella</i> Ten.	H	m	mes-mac	2,0-3,0	2 3
13	<i>Hieracium sparsum</i> Friv.	H	m	alb-illyr-mes-mac	1,7-2,6	1 2
14	<i>Senecio pancicii</i> Deg.	H	m	illyr-mes	1,5-2,5	2 3
BORAGINACEAE						
15	<i>Cerintho glabra</i> Mill. ssp. <i>pirinica</i> (Stoj. et Acht.) Andr. et Peev	H	mx	mes(Pirin)	1,5-2,5	1 2
16	<i>Myosotis orbelica</i> (Vel.)Peev et Andr.	Th	m	mes	1,8-3,0	2 3
17	<i>Myosotis suaveolens</i> W.et K. ex Willd.	H	xm	alb-illyr-mes-mac	1,5-3,0	1 2 3
BRASSICACEAE						
18	<i>Barbarea balcana</i> Panch.	H	hg	alb-illyr-mes-mac	1,5-2,2	1 2
19	<i>Cardamine barbareaoides</i> Hal.	H	hg	illyr-mes-mac	1,0-2,0	1 2
20	<i>Rorippa thracica</i> (Grsb.) Frich.	H	hg	alb-illyr-mes-mac-trac	0,0-2,0	1 2
CAMPANULACEAE						
21	<i>Campanula moesiaca</i> Vel.	H	mx	alb-illyr-mes	1,2-2,5	1 2
22	<i>Campanula patula</i> L. ssp. <i>abietina</i> (Grsb.) Simk.	H	m	alb-illyr-mes-mac-trac	0,5-2,5	1 2 3
23	<i>Campanula patula</i> L. ssp. <i>epigaea</i> (Janka) Hay.	H	m	illyr-mes-mac-trac	0,5-2,5	1 2 3

Table 1 (continuation)

I	II	III	IV	V	VI	VII
24	<i>Campanula velebatica</i> Borb. ssp. <i>bulgarica</i> (Witas.) Maly	H	m	mes-mac-trac	0,7-2,5	1 2 3
25	<i>Jasione bulgarica</i> Stoj. et Stef.	H	m	mes-mac	1,9-2,7	2 3
CARYOPHYLLACEAE						
26	<i>Cerastium decalvans</i> Schloss. et Vuk.	H	mx	alb-illyr-mes-mac	0,0-2,5	1 2
27	<i>Cerastium petricola</i> Panč.	Th	m	mes-mac-trac	0,0-1,5	1
28	<i>Dianthus microlepis</i> Boiss.	Ch	x	mes-mac	1,4-2,7	2 3
29	<i>Herniaria nigrimontium</i> Herm.	H	m	illyr-mes-mac	0,7-2,2	1 2
30	<i>Minuartia recurva</i> (All.) Schinz et Thell. ssp. <i>orbelica</i> (Vel.) Koz. et Kuzm.	Ch	mx	mes	1,0-2,9	1 2 3
31	<i>Silene roemeri</i> Friv.	H	mx	alb-illyr-mes-mac	0,3-2,7	1 2 3
32	<i>Silene velenovskiyana</i> D.Jord. et P.Pan.	H	mx	mes	1,2-2,0	1
33	<i>Silene waldsteinii</i> Grsb.	H	x	alb-illyr-mes-mac	0,6-2,4	1 2
CRASSULACEAE						
34	<i>Sedum kostovii</i> Stef.	H	xm	mes	0,0-2,0	1 2
35	<i>Sempervivum leucantum</i> Panch.	Ch	x	illyr-mes-mac-trac	0,8-2,0	1 2
DIPSACACEAE						
36	<i>Knautia macedonica</i> Grsb.	H	m	alb-illyr-mes-mac-trac	0,0-1,0	1
37	<i>Knautia midzorensis</i> Form.	H	m	alb-illyr-mes-mac	1,5-3,0	1 2 3
38	<i>Scabiosa triniaefolia</i> Friv.	H	m	alb-illyr-mes-mac-trac	1,0-3,0	1 2 3
FABACEAE						
39	<i>Chamaecytisus absinthioides</i> (Janka) Kuzm.	Ph	m	mes-mac	0,5-2,5	1 2
40	<i>Corothamnus rectipilosus</i> (Adam.) Skal.	Ch	x	alb-illyr-mes-mac-trac	0,6-2,5	1 2
41	<i>Trifolium medium</i> L. ssp. <i>balcanicum</i> Vel.	G	m	mes-mac-trac	0,0-1,8	1 2
42	<i>Trifolium velenovskiyi</i> Vand.	H	m	alb-illyr-mes-mac-trac	0,8-2,0	1 2
IRIDACEAE						
43	<i>Crocus veluchensis</i> Herb.	G	hgm	alb-illyr-mas-mac	1,5-2,5	1 2 3
44	<i>Iris reichenbachii</i> Heuff.	G	mx	alb-illyr-mes-mac-trac	0,0-2,2	1 2
JUNCACEAE						
45	<i>Luzula glabrata</i> (Hoppe) Desf. ssp. <i>deflexa</i> (Koz.) Koz.	H	m	mes-mac	2,0-3,0	2 3

Table 1 (continuation)

I	II	III	IV	V	VI	VII
LAMIACEAE						
46	<i>Stachys alpina</i> L. ssp. <i>dinarica</i> Murb.	H	mx	mes-mac	0,9-2,0	1 2 3
47	<i>Thymus albanus</i> H.Braun	H	mx	alb-illir-mes-mac	1,2-2,7	1 2 3
LENTIBULARIACEAE						
48	<i>Pinguicula balcanica</i> Casper	H	hgm	alb-mes-mac	0,9-2,8	2 3
PINACEAE						
49	<i>Abies alba</i> Mill. ssp. <i>borisii-regis</i> (Mattf.) Koz. et Andr.	Ph	m	mes-mac	0,4-2,0	1
50	<i>Pinus peuce</i> Grsb.	Ph	m	alb-illyr-mes-mac	1,2-2,2	1
POACEAE						
51	<i>Festuca horvatiana</i> Markgr.-Dannb.	H	m	alb-illyr-mac-mes	1,6-2,0	1 2
52	<i>Festuca penzesii</i> (Acht.) Markgr.-Dannb.	H	xm	mes-mac	1,0-3,0	2 3
53	<i>Festuca pirinica</i> Horv. ex Markgr.-Dannb.	H	x	mes-mac	2,2-3,0	2 3
54	<i>Festuca riloensis</i> (Hack ex Hay.) Markgr.-Dannb.	H	m	mes-mac	2,0-3,0	2 3
55	<i>Festuca valida</i> (Uechtr.) Penz.	H	m	mes	1,7-2,6	2 3
56	<i>Poa pirinica</i> Stoj. et Acht.	H	mx	mes	2,0-3,0	2 3
57	<i>Sesleria comosa</i> Vel.	H	m	alb-illyr-mes	1,0-3,0	1 2 3
58	<i>Sesleria korabensis</i> (Kumm. et Jav.) Deyl	H	m	mes	1,5-2,0	1 2
59	<i>Stipa balcanica</i> (Martin.) Koz.	H	xm	alb-illyr-mes-mac	0,8-2,5	1 2 3
PRIMULACEAE						
60	<i>Primula farinosa</i> L. ssp. <i>exigua</i> (Vel.) O.Schow.	H	mhg	mes	1,6-2,6	1 2
61	<i>Soldanella rhodopaea</i> F.K.Mey.	H	hgm	mes-mac	1,4-3,0	2 3
RANUNCULACEAE						
62	<i>Aquilegia aurea</i> Janka	H	m	alb-illyr-mes-mac	1,8-2,3	1 2
ROSACEAE						
63	<i>Alchemilla bulgarica</i> Rothm.	H	m	illyr-mes-mac	1,8-2,5	2
64	<i>Alchemilla catachnoa</i> Rothm.	H	hgm	alb-mes-mac	1,8-2,3	1 2
65	<i>Alchemilla gracillima</i> Rothm.	H	m	mes-illyr	1,6-2,4	1 2
66	<i>Alchemilla heterophylla</i> Rothm.	H	m	alb-illyr-mes	2,0-2,3	2 3

Table 1 (continuation)

I	II	III	IV	V	VI	VII
67	<i>Alchemilla pirinica</i> Pawl.	H	xm	mes(Pirin)	1,9-2,3	1 2
68	<i>Alchemilla viridiflora</i> Rothm.	H	m	mes-mac	1,2-1,8	1 2
69	<i>Potentilla regis-borisi</i> Stoj.	H	xm	mes	0,3-2,0	1 2
SAXIFRAGACEAE						
70	<i>Saxifraga exarata</i> Vill. ssp. <i>pirinica</i> (Pawl.) Kuzm.	Ch	hgm	mes-mac	2,0-2,9	2 3
71	<i>Saxifraga sancta</i> Grsb. ssp. <i>pseudosanta</i> (Janka) Kuzm.	Ch	m	mes-mac	2,0-2,9	2 3
SCROPHULARIACEAE						
72	<i>Digitalis viridiflora</i> Lindl.	H	m	alb-illyr-mes-mac	1,0-2,0	1
73	<i>Pedicularis orthantha</i> Grsb.	H	hgm	illyr-mes	0,0-3,0	1 2 3
74	<i>Rhinanthus rumelicus</i> Vel.	Th	m	alb-illyr-mes-mac-trac	1,0-3,0	2 3
75	<i>Scrophularia aestivalis</i> Grsb.	H	mx	alb-illyr-mes-mac	1,0-3,0	1 2 3
76	<i>Verbascum longifolium</i> Ten. ssp. <i>pannosum</i> (Vis.) Murb.	H	m	alb-illyr-mes-mac	1,5-3,0	1 2 3
77	<i>Veronica serpyllifolia</i> L. ssp. <i>trichocaulis</i> Peev	H	m	mes-mac	0,0-2,5	1 2
VIOLACEAE						
78	<i>Viola orbelica</i> Panu.	H	xm	mes	1,2-2,0	1 2

I Number; II Taxa; III Life form: **Ph** - phanerophyte, **Ch** - chamaephyte, **H** - hemicryptophyte, **G** - geophyte /cryptophyte/, **Th** - therophyte; IV Attitude to water regime: **x** - xerophyte, **m** - mesophyte, **hd** - hydrophyte, **hg** - hygrophyte; V Areal-diagnosis; VI Vertical distribution (in km) from - to; VII Vegetation belt: **1** - coniferous forests, **2** - subalpine, **3** - alpine.

The endemic taxa are distributed among the vegetation belts as follows - 36 % in the coniferous belt, 42 % in the subalpine belt and 22 % in the alpine belt (Fig. 3).

The analysis of the life-forms spectra shows the prevalence of the hemicryptophytes (80.6 %). The distribution of the taxa in habitats with different water regime shows the following peculiarity - dominance of mesophytes (47.4%) followed by mesoxerophytes (19.2%) and xeromesophytes (10.2%).

The Balkan floristic element of the granitic part of North Pirin is characterized by concentration in the coniferous and subalpine zones, by predomination of the hemicryptophytes and high participation of the mesophytes and mesoxerophytes.

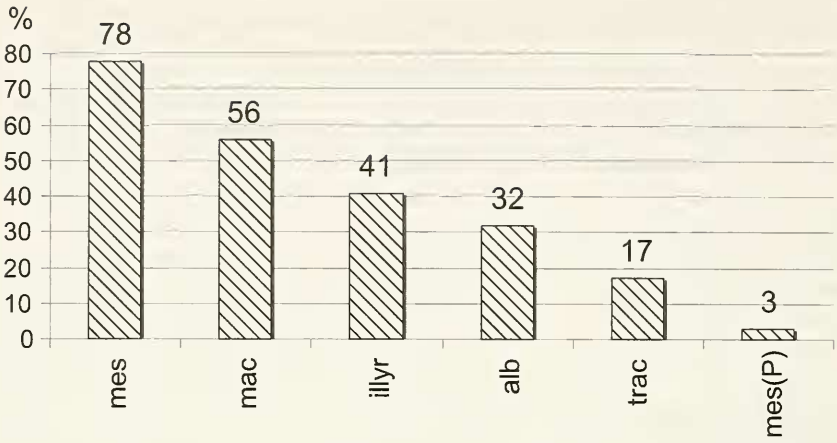


Fig. 2. Geoelement structure

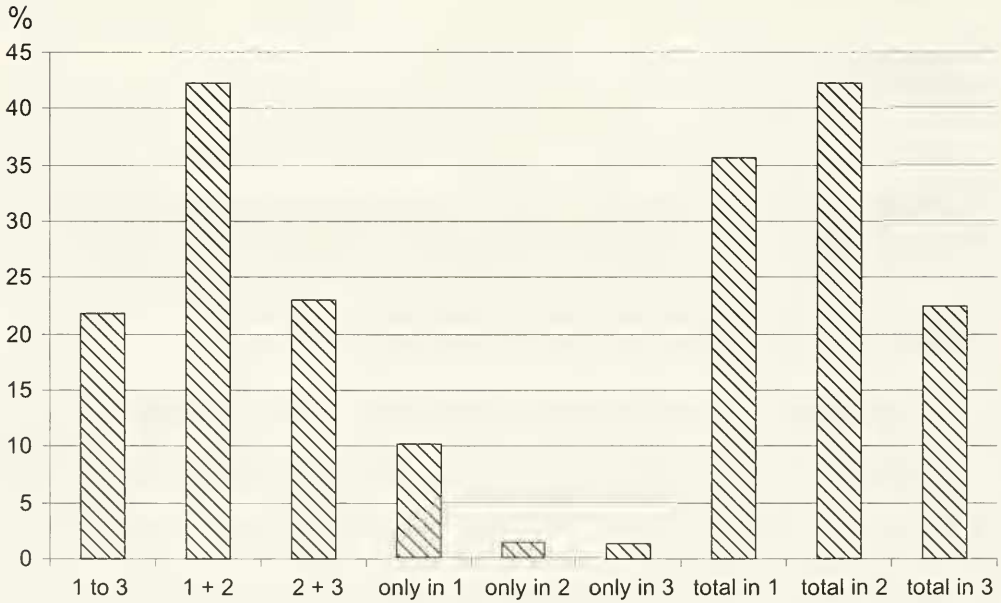


Fig. 3. Distribution of the taxa in vegetation belts

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Бележки върху екобиологичните и фитогеографски особености на ендемичните растения върху силикатни терени в Северен Пирин

Димитър УЗУНОВ

(Резюме)

Изследването е проведено през периода 1992 - 1996 год. във водосбора на река Демяница (Северен Пирин). Върху силикатни терени са установени 78 таксона висши растения (59 вида и 19 подвида) с разпространение, ограничено на Балканския полуостров. Те съставляват 11% от общия брой видове (подвидове) установени в района и се разпределят в 54 рода и 21 семейства. Най-богати на видове са семействата Rosaceae, Caryophyllaceae, Apiaceae, Asteraceae, Rosaceae и родовете *Alchemilla*, *Festuca*, *Campanula*, *Silene*. Два вида и един подвид са локални ендемити за Пирин. Ареалите на 6 вида и 3 подвида попадат в Мизийската провинция. Най-голям е броят на таксоните, включващи в ареалдиагнозите си Македонската провинция - 56%, следвани от Илирийската провинция - 41% и Албанската - 32%. Представено е разпределението на таксоните по растителни пояси. Анализът на биологичния спектър показва доминиране на хемикриптофитите. Разпределението на таксоните по местообитания с определен воден режим се характеризира с преобладаване на мезофити, следвани от мезоксерофити и ксеромезофити.